

# When the Bureaucrats Move out of Business

## A Cost-Benefit Assessment of Labor Retrenchment in China

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Reformers of China's state enterprises should realize that more could be realized from capital transfer than is being gained from labor retrenchment. And more efficient capital allocation, by reducing the pressure on labor, would bring larger gains at a lower social cost.



## Summary findings

Chen and Diwan estimate the costs and benefits of labor retrenchment in state-owned industrial enterprises in China. Their results indicate the prevalence of low and stagnant labor productivity, low capital productivity, and excessively high wages in the state sector for the period reviewed (1994–97).

The private sector exhibited consistently greater productivity.

The authors' most striking finding: A greater gain could be realized from capital transfer than is being gained from labor retrenchment.

Their simulation results for 1996 estimate that 43 percent of the workers in state enterprises and 70 percent of the capital are redundant. By itself, a transfer

of labor from the public to the private sector at the current magnitude (20 percent of the labor force) would secure only 2 percent gains in output. A transfer of 10 percent of both capital and labor would achieve a greater efficiency gain than transferring the full 43 percent of redundant workers. This is partly because the private sector uses capital more efficiently than the public sector and partly because it needs capital to hire workers transferred from the public sector.

Their results suggest that reform in state enterprises should concentrate more on the efficiency of capital allocation, not just on labor retrenchment. More efficient capital allocation would reduce the pressure on labor and would bring larger gains at a lower social cost.

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# **When the Bureaucrats Move out of Business: A Cost-Benefit Assessment of Labor Retrenchment in China<sup>1</sup>**

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## **I. Introduction**

At present, China is at a critical stage in its economic development, experiencing new and growing unemployment and labor problems. The rise in unemployment is directly related to lower demand emanating in the public sector, itself reflecting a steep deterioration of profitability in state-owned enterprises (SOEs) over time. Approximately 50 percent of SOEs are now facing losses and the prospect of bankruptcy. In the past few years, (net) job creation by SOEs has collapsed. And disguised and open unemployment in SOEs is growing rapidly with a vast number of their workers losing jobs and benefits.

At the same time, the state enterprise sector, and the banking system which is backing it are in deep financial trouble. The banks have incurred large amounts of non-performing debts as a result of their financial support of SOEs, with accumulated losses now estimated at between 20 to 40 percent of total loans (about the same share of GDP). The Chinese banking system has emerged as a clear risk to sustained growth at a time when the social pressure on banks to bailout SOEs are becoming stronger. As a result of these forces, the reform of the SOE sector is now at the center of the policy-makers efforts. The coincidence of labor and financial/fiscal difficulties poses several fundamental challenges to the Chinese policy-makers: how to stop the financial hemorrhagea without creating social unrest? How to encourage other sectors to take on the relay on job creation? And how to redirect resources to these more efficient sectors?

In an attempt to reduce the scope of the problem, the Chinese government has focused its attention recently on the mis-allocation of labor between the public and private sectors, and it has announced ambitious plans to improve the profitability of SOEs through downsizing. This

includes a plan to encourage 30 million workers to transfer to the private sector—a figure that represents 30 percent of SOEs workers and 15 percent of the urban labor force. In parallel, the government has initiated reforms to shift the delivery of key services previously provided by SOEs such as housing, health care, education, old age security to new providers in the private sector, public enterprises and local governments.<sup>4</sup>

The major focus of this paper is to estimate the likely costs and benefits of SOEs reforms on labor, although we also look at the likely gains attached to a re-allocation of capital between the state and private sectors. The focus is on industry, for whom reasonable historical series of provincial output has been released recently (in the China Statistical Yearbook, 1994-97). In the first part of the paper, we compare the evolution over time of the efficiency in the use of labor and capital in the state and non-state sector and assess the factors behind the change in the relative performance of these sectors. In the second part, we simulate the effects of transferring labor from the least efficient sector to the most efficient, and estimate the potential gains in output and the effect on the fiscal accounts and the state of the banking system. In the concluding section, we contrast our previous results with estimates of what can be achieved by transferring capital to the private sector, and offer some suggestions to explain the lack of current focus on the allocation of capital.

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<sup>4</sup> The government also has plans to divest small- and medium-size SOEs, but it has refused to relinquish control over the large “strategic” industries.



## **II. The Relative Performance of the State and Non-State Firms in the Chinese Industrial Sector**

The development of the large SOEs that tower over China's industry has been one of the main achievements of industrial policy over the past four decades. Lin et al (1996) recount how all major prices were distorted starting in the 1965s in order to help achieve the aim of building what was perceived as the strategic engines of growth – heavy industry, energy, machinery. These “strategic” industries were capital intensive, urban, and modern. To achieve these aims, capital, foreign exchange, and energy had to be available at cheap prices. Input prices were heavily subsidized. The resulting backlash on the rest of the economy was such that ultimately, the state nationalized most of private enterprise in the 1960s.

Several studies have described the steady deterioration in state controlled industry, as a result of incentive and informational problems. As a result, several waves of reform have been initiated over the years by the government. The privatization of farming sector in 1979 turned out to be a major success and favored a definite movement towards more private sector activity. Over the past decade, China's industrial growth has relied mainly on the dynamic performance of private and small collective owned enterprises, in particular, the township and village enterprises (TVEs). In the late 1980s saw the emergence of joint-ventures investments spearheaded by large MNCs and Chinese capital from the rest of Asia, and this FDI and increase in export growth became the main engine of growth.<sup>5</sup> The role of state turned to the containment of the scope of losses in the public sector, under a self-imposed constraint of maintaining a fast growth rate in the midst of stable macroeconomic policies.

In the headways of the 1980s and 1990s, this strategy played out well. State-owned enterprises gradually lost their importance to the non-state sector. This in turn reduced the pressure on the

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<sup>5</sup> In the 1990s, China has attracted a large share of FDI going to developing countries, averaging about \$45 billion a year in the past decade.

state to crowd out this sector by directing credit to state enterprises, and improved the credibility of the government in pursuing a market friendly strategy. The result was no less than dramatic. In 1980, SOEs produced 76 percent of gross industrial output. By 1997, this share had fallen by nearly two-thirds to 25.5 percent. Private enterprises, shareholding firms, joint ventures, and foreign-owned firms increased their share from 0.5 to 36.4 percent over the same period. (See Table 1)

### **Efficiency Considerations: A Literature Review**

Containing the costs of this strategy has necessitated a continuous attention to the financial health of SOEs. An important set of reforms was initiated with the establishment of the “contract responsibility system” that established some accountability in the SOE system in 1979. More recently, a modern rules-driven corporate system was introduced to state enterprises. These reforms have generally achieved their intended goal of improving technical efficiency. In industry, estimates of the production function in several studies demonstrated that greater enterprise autonomy increased the productivity of the state enterprises (Chen et al. 1988, Jefferson, 1994, Dollar 1990), but at a lower rate than private sector.

But the financial position of SOEs has deteriorated more sharply since 1992. The total deficits of unprofitable industrial SOEs increased five-folds since the early 1990s. Two factors have been analyzed in the literature to explain the poor performance of SOEs in recent years, a rising compensation bill, and relatively decline in technical efficiency.

The first factor is the rapid rise in wages and fringe benefits such as housing, education, health care, and retirement pensions (Sachs, Woo, 1994, Gordon and Li, 1997). Wages have generally risen at a slightly slower pace than output growth<sup>6</sup> reflecting strong labor demand by the non-state sector. Previous studies argued that the increasing autonomy of SOEs in the absence of private property rights has led to excessive workers remuneration. Specifically, in their enterprise sample Woo et al. (1994) report a large increase in the share of labor incomes through value-added. A study by Fan and Schaffer show that the increase in government subsidies is due to a faster increase in wages, fringe benefits and other unauthorized expenditures (Fan and Schaffer 1991). The social obligation of SOEs is not a new phenomenon. However, in recent years the cost of providing social welfare has risen fast.<sup>7</sup> There are two main reasons for this rapid increase during the 1990s: aging population, and rising medical costs. As the proportion of employed labor shrinks and the number of pensioners rises, SOEs are forced to draw on current revenue to fund spending on increasingly expensive social welfare.<sup>8</sup> Data from China Yearbook shows that the share of insurance and social welfare funds" in the state sector has risen from 17% in 1980 to 33% of total wage bill in 1997 (if we include employer subsidies to housing and the cost to enterprise of dealing with redundant workers, estimated ratio could be up to 75% of total wage

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<sup>6</sup> Two possible reasons: first, the Chinese government has been able to maintain substantial implicit taxes and transfers among workers in the state sector, implemented through direct controls over relative wage rates. Second, lack of influence of labor union over wage rates (Gordon and Li, 1997)

<sup>7</sup> For example, the social welfare bill increased from 11.6 billion in 1980 to 257.8 billion in 1997, a rise of 182 percent at current prices.

<sup>8</sup> The World Bank "China 2020" reports that the ratio of workers to pensioners is projected to decline from 10 to 1 in 1995 to about 3 to 1 in 2050.

bill). Over the same period, the profit rate in the state sector has fallen from around 20% in 1980 to 6.9% in 1996.

The second factor has been the relative slow improvement in the state sector's technical efficiency (Chai, 1994; Woo et al., 1994). This was mainly related to increased price competition from the non-state sector, in particular, the autonomous township and village enterprises (TVEs) which has eroded profit margins (Jefferson, Rawski and Zheng, 1992). A recent study (Raiser, 1997) using enterprise level data for various ownership forms from four coastal cities shows that the profitability decline in the SOEs is mainly related to growing competitive pressures from the non-state sector are responsible for the erosion of profit rates in Chinese industry.

Since non-state enterprises in China—in particular, the TVEs—have become an increasingly important economic sector outside state-planned production, much attention has been given to comparisons of performance between the state and non-state sectors. Most of these studies focused on total factor productivity (TFP) growth to examine if enterprise reforms have initiated efficiency improvement in SOEs. Existing comparative work include Jefferson, Rawski and Zheng (1989, 1992, 1994, 1996) and Wu (1993, 1995, 1996). These studies reveal that productivity in both the state and non-state industry has risen in recent years. However, the performance of SOEs in terms of output has been much worse than that of the non-state firms.

When studies compare TFP growth across ownership categories, the results reveal that the higher rate of output growth in collective owned enterprises (COEs) and the TVE sector was largely due to the higher rate of TFP growth in the non-state sector. For example, Wu and Wu (1993)

estimated time-series models and examined partial and total factor productivity for both state and rural enterprises. While they found that the TFP growth rate in the state industrial sector was positive, averaging about 2.5 percent, it lagged behind that in the non-state sectors, particularly township and village enterprises which averaged about 13 percent. The main explanation for the increase in the state sector's labor productivity in recent years is capital deepening. However, disagreements still exist regarding the rate of TFP growth in SOEs.

### **Efficiency: Empirical Analysis**

We now explore what our data set has to say about these issues and estimate aggregate production functions in the state and non-state industrial sectors using provincial data. The provincial data is known to suffer from various aggregation problems, and findings using aggregate data analysis are likely to be biased (e.g. Jefferson, 1990 for a discussion). Partly to overcome this problem, most of existing studies turns to enterprise-level data for firm-level efficiency analysis. However, their data sample so far has only covered a limited number of industries and provinces. None of the studies look at the whole industrial level, at the same time covers the entire non-state sector. The industrial sector is one of the largest components of the economy, employing 30 percent of the (formal) labor force. In the Yearbook definition, the industrial sector is comprised of mining, quarrying, and manufacturing as well as electricity, gas and water.

We have constructed a data set for 30 Chinese provinces, and for the years 1994-97.<sup>9</sup> We have estimated data for the non-state sector by deducting state sector figures from economy-wide figures, assuming the economy is made up of the state and non-state sector. As constructed, the non-state sector includes collective owned units (urban and rural), joint owned, sharing holding and foreign funded firms. The series we focus on are the total industrial value-added, fixed capital asset, and the total number of industrial employees in state and non-state sectors. Industrial value-added and total fixed capital assets of industrial enterprises are those reported for industrial enterprises with independent accounting systems. Limiting our analysis to those “independent accounting units” of the industrial sector introduces some bias towards large firms, but it still captures a lot of the action in state industry, as it accounts 95 percent of SOEs gross industrial output. Both fixed capital asset and industrial value-added are deflated by a price index of investment in fixed asset and ex-factory price indices of industrial outputs based on 1996 price.

Our data set illustrates well several of the features described above. The difficulties encountered by containment in the mid-nineties are clearly apparent. While the share of total labor and capital received by the state sector has remained roughly the same (60+percent of each), its share in value added has been falling (from 54 to 46 percent between 1994 and 1997). This fall in efficiency supports the notion that labor and capital are not as productively employed in the state

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<sup>9</sup> Due to different methods of data compilation used before 1994 in the China Statistical Yearbook, we cannot obtain consistent private sector data on industrial value-added, fixed capital asset and industrial labor. Our analysis is therefore limited to the past four year's data. While aggregate data is known to be of poor quality, this is perceived by many analysts to be especially the case for the 1995 series, which we treat below with more caution.

sector as in the non-state sector<sup>10</sup>. Both the average capital and labor productivity are much higher in the non-state sector -- in 1997, nearly 100 percent and 60 percent more respectively. Over time, the average productivity of labor stagnates in the public sector, while it rises in the non-state sector (by about 50 percent over the four years), resulting in a greater divergence over time.

Second, the average productivity of capital has declined in both the state and non-state sector from 1994-97, with the fall in the state sector especially large. It is interesting to observe that in spite of (or perhaps because of) the decline in the efficiency of capital, there has been a fast rise in capital intensity in both the state and non-state sectors, which nearly double during the four years.<sup>11</sup> Surprisingly, the capital to labor ratios in the two sectors is about equal.<sup>12</sup>

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<sup>10</sup> Since 1996, an increasing number of workers called "Xiangang worker" have been made redundant while remaining on the state firms' wage bill, typically receiving minimum wage and some social services. By the end of 1997, some estimated about 11.5 million (some millions are from industry). However, in China Statistics Yearbook, the Xiangang workers remain included in the formal labor statistics. This introduces some bias in our analysis, but there are no reliable state-level estimates on the actual number of Xiangang workers that we can rely on to remove this bias at this stage.

<sup>11</sup> Similar findings were obtained by Enos (1984) when he examined five small rural industries: iron and steel, chemical fertilizers, farm machinery, cement, and energy (coal and electricity).

<sup>12</sup> This reflects mixes of small and large firms in both the public and private sectors, with the first owning millions of small and medium size firms in addition to a few thousands towering firms, while the latter is comprised of small TVEs and large joint-ventures. It is evident that TVEs has attracted most of rural household saving towards its capital formation, averaged annual rural household saving is about 40 percent.

The data shows interesting regional patterns, especially in productivity differences between the state and non-state sector (see charts in the Appendix). Coastal and high-income provinces tend to have a larger non-state sector. The productivity gap—labor and capital—between state and non-state sectors is larger in coastal provinces, such as Guangdong, Shanghai, Jiangsu, Zhejiang and Shandong, than in the inner provinces.

We also estimate “average” provincial production functions of the Cobb-Douglas type in the state and non-state sectors, and for various years (see table 4). This allows for the computing of the marginal efficiencies of capital and labor. The results for 1996 and 1997<sup>13</sup> and for the pooled 1994-1997 data show that the non-state sector has a higher marginal productivity of labor and capital than the state sector. The gap in capital performance has always been large – in the order of two. The gap on the labor side has been small in the past, but has risen a lot recently, indicating perhaps the difficulty that the private sector is encountering in finding skilled labor.

With the available information, it is possible to compare roughly marginal productivity and the value of compensation, in the two sectors. Comparing tables 2 and 4, it is apparent that workers are overpaid in the state sector, and perhaps underpaid in the non-state sector (compared to their marginal productivity). Based on 1997 data, wage and non-wage income per state worker is 53

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<sup>13</sup> We excluded 1995 estimates due to poor quality of data that compiled by China Yearbook. Here we only report 1996 and 1997 estimates, the previous years of labor productivity performance have been estimated in other studies that are not reported here.



percent higher than its marginal productivity; for non-state worker, marginal productivity is about 44 percent *higher* than wage<sup>14</sup>.

In sum, our data set points clearly a picture of stagnating labor efficiency, but with a fast rise in its compensation. In contrast, labor productivity has risen fast in the non-state sector, and so have wages, although they seem to have somewhat lagged behind. On the face of it, there is a rising misallocation of resources, and a movement of labor from the public, and to the private sector would increase total output. We now look at this issue more carefully.

### **III. Gains from Enterprise Restructuring**

According to economic principles, the allocation of factors from low return to high-return activities can improve productivity and raise total output and national income. This is the reason that the objective of economic reform is to create the conditions, which motivate enterprises to improve overall efficiency and permit the owners of individual factors to seek the highest returns. The transfer of workers to the non-state sector produces social gains resulting from increased productivity levels of transferred workers. This is due not only to the migration of high-skilled workers to the non-state sector but also to the fact that workers of any given skill level exert more effort in their new jobs in the non-state sector than they did previously when working in the state sector. In evaluating social efficiency of public sector downsizing, Rama argued that economic return, result from a better allocation of labor across sectors. When

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<sup>14</sup> Other evidence suggests that wage equalization is likely to hold for high skill labor, suggesting that there is wage compression in the state sector with implicit subsidies to low-skill workers.

contribution of displaced workers to aggregate welfare is higher out of public sector than in it, downsizing has positive economic returns.

On pure efficiency grounds, the optimal allocation of labor in the economy occurs when the marginal productivity is equalized. Using the estimated production functions, we can solve for the needed transfers of labor and capital that achieves this equality. The results are shown in Table 5.

Our 1996 results show that within the industry, 43 percent of labor (and 70 percent of capital) needs to be transferred to the non-state sector to ensure efficient resource allocation and overall higher productivity growth.<sup>15</sup> The 1997 results suggest that even larger amounts of labor and capital need to be transferred to the non-state sector (57 percent and 74 percent of state industrial labor and fixed capital asset). The estimates for labor are consistent with Chinese officials' assessment of the extent of surplus labor in SOEs at between one third and one half of the work force (See Fan, O'Corr and Lunati, 1998).

The estimated gains in GDP are large. A 43 percent transfer of labor to the non-state sector will produce a gain of 2.56 percent of 1996 GDP, and a 70 percent of capital transfer will produce a gain of 8.29 percent of 1996 GDP. This of course assumes full employment of redundant workers, if we consider that laid-off workers remain unemployed for a while, or not simply not re-employable in non-state sector, and are retired early, the total social gain could be smaller. If

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<sup>15</sup> Note that 43 percent of industrial SOE workers represent 21 percent of total SOEs workers and 11 percent of urban workers.

we transfer both capital and labor together, the total gain will reach 17.4 percent of 1996 GDP. This gains are available year after year, and thus, there present value is many-folds larger. These represent major sectoral shifts: 43 percent of labor movement out of SOEs would result in a 15 percent decline of output in the state sector and 33 percent of increase in output increase in the non-state sector (see Table 5).

But when considering laying off unproductive workers from the state-sector, three other considerations—which we do not measure in our simply static analysis, should also be kept in mind: the social, financial and economic dimensions. They are likely to be related.

- Laid-off workers do not necessarily join the private sector immediately. From a political economy perspective, a rapid release of large numbers of workers into the labor force would produce “search” unemployment and may trigger political backlash and social upheaval, which would scare away capital and weaken the benefits of reforms.
- On the other hand, releasing labor also reduces the losses of SOEs, improves the condition of banks, and makes more capital available to fuel the growth of the more efficient private sector. By the same token, the continuation of the present situation weakens the financial system, indeed, threatens its stability, and taxes the growth potential of the country.
- Large layoff is likely to lead in the short term to a reduction in aggregate demand. Fear of being layoff has eroded consumer confidence in spending, and this in turn will reduce profitability and investment in the short term.

How do the social and financial considerations affect the optimal redeployment decision? It is useful to consider first a central case where the government compensates workers completely for their losses (from Diwan, 1995). Assume a simple one period world where workers move at zero cost between the sectors. Denoted by  $p$ , the wage of workers in the public sector, let  $g(L, \dots)$  represent the production function, and denoted by  $g'$ , the marginal productivity of labor (we assume that  $g' > p$ , that is, that the PE over-utilizes labor and makes losses on this account). Denoted by  $m$ , the wage in the private sector, (which is assumed to equal marginal productivity of labor in this competitive sector). We must have  $p > m$ , since otherwise, the SOE's workers would have moved to the private sector. In this simple set up, the governments firing decision depends on a comparison between costs and benefits. For each exiting worker, the PE gains  $[g' - p]$  at the margin. This must be compared with the cost of compensation. Full compensation, in the absence of adjustment cost, is given by  $[p - m]$ . The SOE should therefore keep firing workers until  $[g' - p] = [p - m]$ , that is, until  $g' = m$ . This is the rule used in our simulations above. Under our base assumptions, the rule both maximizes welfare and minimizes the SOEs' deficits (and thus, the bank losses, and the state's implicit liabilities).

Consider now departures from these assumptions. First, let us focus on the social dimension. It is likely that there are costs of transition from job to job. Full compensation would then be more expensive, and less than full layoffs would be optimal if full compensation had to be paid (i.e., less than it takes to equalize the marginal productivity of labor among the two sectors). In the

same vein, if fast layoff increases by itself the size of the job-to-job transition costs, then the optimal speed of layoff would be reduced further.<sup>16</sup>

Indeed, there is ample evidence that the labor market is already weakening considerably. The pace of restructuring has intensified since the CCP's Fifteenth Congress in 1997. Large unproductive firms are encouraged to convert to joint stock or limited liability companies. Small- and medium sized SOEs have been restructured through annexation, shareholding, bankruptcy, business closedown, leasing, auction and private sales. As a result, there were 11.5 million state workers made redundant by 1997, and three million were laid off during the restructuring process in 1998. A recent study shows that the non-state sector is absorbing many of those laid-offs. Within a year, more than half of the laid-off worker found new jobs, with sixty percent of those joining the private sector either by setting up their own company or working for private companies (See China Business Review, Oct. 1998). However, it appears that unemployment has risen sharply, the official unemployment rate has risen to over 7 percent, but the real rate is probably much more.

Second, we need to look at financial complications relative to the simple model. Note that the compensation that needs to be offered is of a stock (or promissory) nature, while the benefit is a flow. This has no bearing on the analysis as long as the public sector is not credit constraint, since the layoff decision creates value overall, even if it is initially unfavorable from a cash flow perspective. In the current situation of a weak and over-indebted banking sector however, overall

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<sup>16</sup> Aghion and Blanchard (1994) argue that hasty restructuring in the state sector, due to the resulting high unemployment which generates congestion costs and increased search costs for new jobs.

credit is however limited by creditworthiness considerations. In such a world, the payment of compensations to fired workers would in the short-term crowd out private investment. These constraints directly reduce the optimal speed of layoff in a manner that makes the cash flow smoother (i.e, fire and pay compensation at the speed at which the efficiency gains from previous retrenchment are realized). But they also put pressure on the government to optimally reduce the scope of compensations in order to allow sufficient credit to flow to the private sector, thereby improving labor demand, and reducing the need for high levels of compensation.

Using our estimates of marginal productivity of labor and its cost, the 1996 data shows that SOEs incurring annual losses from keeping unproductive worker is about 3053 Yuan per worker per year. As the result of labor transfers, the total gain from 43 percent of SOE industrial workers migrating to the non-state sector will save SOE the equivalent of 0.8 percent of 1996 GDP. But how much would it cost in compensation?

Table A1 in the Appendix summarizes major labor redeployment programs, which have been run in various cities and provinces, and the attached average compensation cost per worker. These costs include unemployment insurance, early retirement, a basic living allowance subsidy, and a one-time lump sum payment. Some programs have also offered active labor redeployment components such as training and retraining, subsidy to individual business, tax break and subsidy to employer of hiring redundant workers. On average, compensation cost ranges from 2,000 to 10,000 Yuan per worker per year and varies from city to city<sup>17</sup>. Using a central figure of 3600

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<sup>17</sup> Most of workers redundant or laid-off do not receive severance payment from Chinese firms, instead, minimum living allowance has be provided by government on the monthly basis.

per year attached to the compensation scheme which is widely used by the Chinese government—that is, minimum income support<sup>18</sup> of approximately 250 Yuan plus 50 Yuan for medical expenses per month per worker, and considering to illustrate an average unemployment spell of one year, the program would cost 0.96% of 1996 GDP for 43% of SOE industrial labor transfer (about 22.49 million workers<sup>19</sup>). This one short cost is close to the benefits of reform that would accrue year after year. It thus seems as a very good deal from a pure financial/fiscal perspective, both on cash flow (small loss in year 1, pure gains after), and from a stock perspective (net present value gains in the order of 10 percent of GDP).

But how does it compare to the likely losses born by labor? The 1997 figures that are available to us show that private sector wage income is 9092 Yuan per worker, versus 9128 Yuan per worker in state sector. Since these are about equal, the main loss experienced by workers is the drop in their income during their search for a new job, which is large given the ongoing levels of compensation if job search lasts long. The minimum support for example is about a third of average wages only. In addition, while housing is almost always provided for SOE employees, it is far from clear that laid-off workers would continue to be able to use the same facilities,

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<sup>18</sup> The national "minimum living income" was set at 164 Yuan in 1996, 155 Yuan in 1995, and 136 Yuan in 1994 and 114 Yuan in 1993. However, layoff allowances are set in different regions. For example, allowance in Beijing is 260 yuan every month, relatively high, the National average standard is 200 Yuan in 1993. A national survey in 1998 shows that 93.2% of the Xiagang workers have received the monthly allowance, ranging from 140 yuan to 380 yuan in different cities.

<sup>19</sup> The department of Labor predicted that from 1995 to 2000, the number of laid off worker will reach 18 million.

especially if they have to move in search of a job. This would increase the loss of laid-off workers significantly.<sup>20</sup>

This suggests that the state should be more generous on the compensation side, especially if it is keen on laying-off so many workers so fast<sup>21</sup>. Since this is unlikely to be feasible financially, the considerations above suggest that labor retrenchment should be slowed down, and that other means to economize on financial resources in the meantime should be found. Our simulations suggest that large gains can be harvested by also transferring capital from the least efficient SOE to the non-state sector. Indeed, the gap in capital productivity between state and non-state is larger than the gap in labor productivity and the predicted output gain from capital transfers are much larger than that from labor transfer. As indicated in Table 5, we find that in 1996, it would have been optimal to transfer 70 percent of capital to the private sector, and that this would have resulted in a huge gain 8.3 percent of GDP per year!

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<sup>20</sup> It seems that given the compression of wages in the public sector, skilled workers tend to be less overpaid in the public sector, and they tend to migrate voluntarily. This labor migration from the state sector to non-state sector has been overwhelming in recent years, especially as the demand for skilled workers in the private sector has taken off. This migration is unofficially called "the dive into the ocean" (xia hai) and usually in a family the more productive young and male "dive" while the rest stay in the state sector (mimicking the official line of "one family, two systems"). Recent estimates are that over 20% of China's public sector labor force have already moved to the "ocean". Unfortunately, there has been no systematic and economy-wide empirical studies in this regard (See Gordon and Li, 1997)

<sup>21</sup> Chinese economy at present has already shown the negative macroeconomic effect of declining in private spending and aggregate demand due to the low wage rate of civil workers and insufficient minimum level of income support to redundant workers.



However, contrary to the focus on labor retrenchment, no such movement has been observed to date on the capital front (rethorics aside). The figures in Table 3 indicate that over 65 percent of capital formation took place in the public sector during the 1994-97 period. Banking sources indicate that SOEs have consumed between 70 and 80 percent of China's savings over the recent years, or about 20 percent of GDP.<sup>22</sup>

What are the possible explanations for the lack of action of the financial front, and the current zeal on the labor front? There are two possible explanations: banks' incentives, and SOE's incentives. During financial distress, banks often prefer to undertake defensive lending – lending enough to keep the firm afloat and waiting for better times – rather than face the reality of corporate defaults. These incentives are exacerbated by their inability to collect a part of their loans during corporate workouts, especially because of the broad nature of the claims that workers hold on the SOE that employs them (social benefits, pension, ect..). Second, SOEs are likely hold strong bargaining powers when negotiating with the center, especially when they have control large pools of labor.

But clearly, the reallocation of capital towards the more efficient non-state sector has to be brought into the discussion. Table 6 shows how combinations of labor and financial retrenchment are complementary and can bring larger gains at lesser social cost. For example, moving 10 percent of the labor *and* capital from state to non-state brings more efficiency gains

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<sup>22</sup> But according to Fan (1998) state and commercial banks have become increasingly unwilling to provide credit to unprofitable SOEs preferring instead to lend to the private sector. He estimates that in 1998, 42 percent of state bank lending went to private sector.

(2.8 percent of GDP per year) than the retrenchment of 43 percent of the public sector labor force. This of course makes eminent sense: a focus on labor only would increase capital labor ratios in SOEs, and reduce the efficiency of capital. At the very least, the government should try to keep the capital labor ratio constant by re-deploying in parallel as much capital as labor. This would both improve efficiency, and by slowing down the layoff period, minimize social unrest.

#### **IV. Concluding Remarks**

Chinese policy-makers face a stark dilemma: the fast closure of a large number of SOEs would lead to high open unemployment, at least in the short run, and lead to social unrest that would scare away private investment; but writing-off loans to bankrupt enterprises in order to bail them out would undermine the fragile banking system, and that too would scare away new investors. Caught between the rock and a hard place, the Chinese government will have to figure out a middle ground and structure a path of retrenchment cum compensation to layoff workers that is both credible and financially viable.

To be more specific, the speed of layoff should consider social and financial dimensions. If social adjustment cost is high, likely layoff cost would be high; thus, the optimal speed of layoff should be slow. In particular, large-scale layoff is difficult in a country that lack of social safety nets and social security market. Cross- country experiences, especially those in Eastern and Central Asian have shown that countries that do not have labor market and social insurance programs in place, labor recovers more slowly from enterprise restructuring and encounter much more labor difficulties than countries that do. Furthermore, a generous compensation to fired

workers in the short term would crowd out private investment, it has potential to reduce sufficient credit flow to private sector. Thus, private sector job creation through small business development needs to be encouraged to put less pressure on labor transfer.

This paper's contribution is to explore what such a path may look like, using estimated production functions for the state and non state industrial sectors to simulate the productive effects of moving labor and capital from the less efficient state sector to the more efficient private sector. Clearly, we do not take the specific results we get too seriously since the production functions we estimate aggregate indiscriminately a variety of firms small and large, and with very different problems. However, we trust that the order of magnitude we get are robust and thus, symptomatic of the existing Chinese economic structure. This sense is reinforced by two factors: that the data set we use exhibits many characteristics that have been documented by other sources, such as the decline in the efficiency of SOEs and the rise in the importance and efficiency on non-state firms; and that results are roughly robust to the choice of estimation year.

Our paper measures labor and capital productivity in both state and non-state industrial sector through estimating aggregate production function using 30 provincial pooled data from 1994 to 1997. Low labor and capital productivity, stagnated labor productivity and overpayment are found to be prevailing in state sector over time. Our three-year separate and averaged estimation all show a sizable gain from labor retrenchment. In particular, our 1996 simulation results estimate that 43 percent of labor (or some 23 million state-owned enterprise workers) and 70 percent of capital are redundant. An estimated benefit of 43 percent of labor transfer alone will

produce a gain of 3.36 percent, while costing of 0.96 percent of GDP (one time layoff compensation). Labor downsizing has a positive economic rate of return.

What do our results mean for the recently announced plans to accelerate the layoff of up to 30 million workers from the state sector in the next few years. Our estimates corroborate the order of magnitude of labor redundancy. But somewhat surprisingly, we also find that by itself, a transfer of labor from the public to the private sector of this magnitude would only secure relatively small gains in output, of the order of 2 percent a year. This is of course far from insignificant, but neither is the task of moving around 20 percent of the labor force!

We also found that much larger gains can be achieved if the SOE reform movement focuses at the same time on the financial aspect of the problem. In particular, a transfer of 10 percent of labor and capital achieves a greater efficiency gain than the transfer of the full 43 percent of redundant workers from the public to the private sector. This important result is due to two factors: first, that capital is much more efficiently used in the non-state sector, with the efficiency gap larger than in the case of labor. And second, that the non-state sector will need to have access to more capital in order to employ the workers that are being laid off by the private sector. More important, efficiency capital allocation would reduce the pressure on labor and bring larger gains at a lower social cost.

How can a more balanced approach be achieved? Progress can be made on both flows and stocks. On flows, the challenge is to reduce the net flow of finance to SOEs in ways that can discriminate between good and bad ones. This would have to involve rapid progress in the setting up of capacity in the banking supervision institutions. In addition, rules will have to be

changed to reduce the incentives of banks to lend to bad firms, with the aim to simplify the workout exercises and the distribution of the assets of bankrupt firms to its stakeholders. A crucial component of this is the separation of the welfare from the business aspect of firms, in particular, the setting of an independent social security system so that this task can be separated from the SOEs. This will enable the government to better provide strong incentives for the SOEs, including the option of outright privatization. But a focus on flow wills unlikely is sufficient, and the privatization process will also have to be accelerated. This too will require rapid progress on disentangling the welfare and business functions of SOEs.

**Table 1: Share of Gross Industrial Output Value by Ownership**  
(100 million, calculated at Current price)

	State sector	Non-state Sector	
	SOEs	Collective owned	Other ownership <sup>b</sup>
1962	87.8%	12.2%	0.0%
1980	76.0%	23.5%	0.5%
1985	64.9%	32.1%	3.1%
1990	54.6%	35.6%	9.8%
1995	34.0%	36.6%	29.4%
1996	28.5%	39.4%	32.1%
1997	25.5%	38.1%	36.4%

Data source: China Statistical Yearbook

"b" other ownership include joint ventures, solely foreign-owned firms, shareholding firms and private companies.

**Table 2: A Comparison of Base Wage and Welfare Benefit (Non-Wage) Per Worker by Ownership**  
(unit = Yuan at current Price)

	SOEs	Wage income		SOEs	Welfare benefits	
		Collective	Other private		Collective	Other private
1997	6747	4512	8789	2335	1166	339
1996	6280	4320	8261	2042	1053	337
1995	5625	3931	7463	1758	935	293
1994	4797	3245	6303	1468	755	275
1992	2284	1681	2987	1006	549	133

Notes: Welfare benefits do not include housing benefits in the above statistics. We expect that state workers' benefits could be even higher if housing benefits were added. The share of total benefit per worker will increase to 60-70 percent of total income per worker.

**Table 3 Basic Industrial Information**  
(at constant price, 1996=100)

		1994	1995	1996	1997
State	Value added	9.34E+11	8.55E+11	8.74E+11	9.09E+11
	Fixed capital asset	2.08E+12	2.64E+12	2.83E+12	3.04E+12
	Labor	43710000	43970000	42774000	39459000
	Share of capital	66.6%	66.1%	65.4%	63.4%
	Share of labor	66.4%	66.5%	66.3%	64.7%
	Share of value-added	53.8%	53.8%	48.5%	46.2%
	K/L ratio	47546.37	60109.52	66227.38	76929.88
	Output/K	0.42		0.28	0.27
	Output/L	20663		19834	22455
Non-state	Value added	8.04E+11	7.35E+11	9.28E+11	1.06E+12
	Fixed capital asset	1.04E+12	1.36E+12	1.5E+12	1.75E+12
	Labor	22110000	22130000	21726000	21534000
	Share of capital	33.4%	33.9%	34.6%	36.6%
	Share of labor	33.6%	33.5%	33.7%	35.3%
	Share of value-added	46.2%	46.2%	51.5%	53.8%
	K/L ratio	47137.51	61237.77	68919.77	81318.07
	Output/K	0.79		0.61	0.58
	Output/L	27017		33354	39017

Source: China Statistical Yearbook



**Table 4: Production Function Estimation**  
(at constant price, 1996=100)

Year	Sector	logA	Output elasticity To labor	T stat.	Output elasticity to capital	t stat.	R <sup>2</sup>	MPL <sup>^</sup>	MPK <sup>^</sup>
1996	State	0.19	0.30	1.75	0.78	4.07	0.95	5917.8	0.22
	Non-state	1.85	0.41	3.78	0.68	7.12	0.97	13508.4	0.41
1997	State	-0.95	0.21	1.40	0.87	5.00	0.94	4759.8	0.24
	Non-state	1.72	0.40	3.21	0.69	6.21	0.96	15438.3	0.4
Common Effect 1994-97 (exl. 1995)	State	0.433	0.247	2.65	0.8345	8.02	0.94	5175.9	0.27
	Non-state	1.631	0.352	5.36	0.722	12.56	0.97	11470.8	0.47

Notes: ^ indicates estimated figures.

**Table 5**  
**Output gains/losses after labor and capital transfer from state to non-state sector**  
(as share of GDP)

<b>1996 estimation</b>		
	as a result of labor transfer (43% of labor transfer)	as a result of capital transfer (70% of capital transfer)
Share of total loss (-)/share of total gain(+)		
State	-15%	-61%
Non-state	33%	118%
Net gain	2.56%	8.29%
<b>1997 estimation</b>		
	as a result of labor transfer (57% of labor transfer)	as a result of capital transfer (74% of capital transfer)
Share of total loss (-)/share of total gain(+)		
State	-16%	-69%
Non-state	38%	114%
Net gain	3.42%	7.74%
<b>1994-1997 estimation</b>		
	as a result of labor transfer (12% of labor transfer)	as a result of capital transfer (70% of capital transfer)
share of total loss (-)/share of total gain(+)		
State	-6%	-48%
Non-state	11%	117%
Net gain	1%	10%

Table 6: Simulation of total output gain as result of K and L transferred to non-state sector  
(as share of 1996 GDP based on 1996 simulation)

Total	Labor							
Output gain	L <sub>t</sub> =0%	L <sub>t</sub> =5%	L <sub>t</sub> =10%	L <sub>t</sub> =20%	L <sub>t</sub> =30%	L <sub>t</sub> =35%	L <sub>t</sub> =40%	L <sub>t</sub> =43% L <sub>t</sub> =98%
Capital								
K <sub>t</sub> =0%								2.6%
K <sub>t</sub> =5%		1.4%						4.0%
K <sub>t</sub> =10%			2.8%					5.3%
K <sub>t</sub> =20%				5.8%				7.8%
K <sub>t</sub> =30%					8.7%			10.0%
K <sub>t</sub> =35%						10.3%		11.3%
K <sub>t</sub> =40%							11.8%	12.1%
K <sub>t</sub> =45%								13.1%
K <sub>t</sub> =50%								14.0%
K <sub>t</sub> =60%								15.8%
K <sub>t</sub> =70%	8.0%	9.6%	10.9%	13.1%	15.0%	16.0%	16.9%	17.4%
K <sub>t</sub> =98%								31.3%



## **APPENDIX**

Chart A1.

Average productivity of labor in 1996

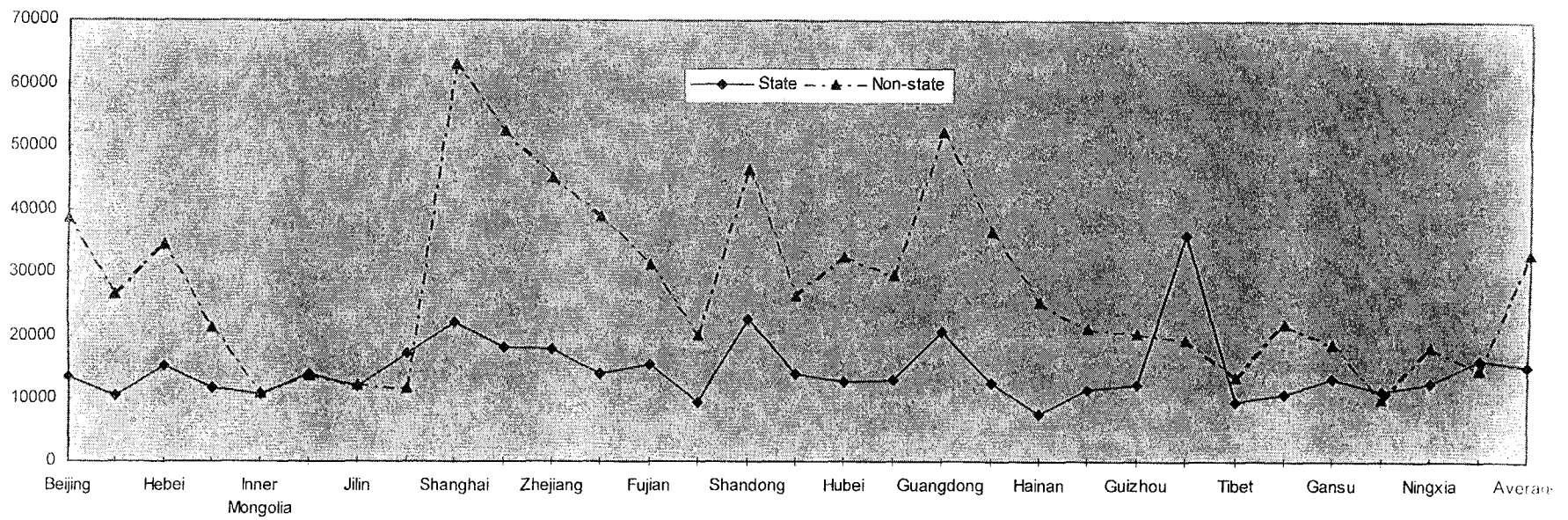
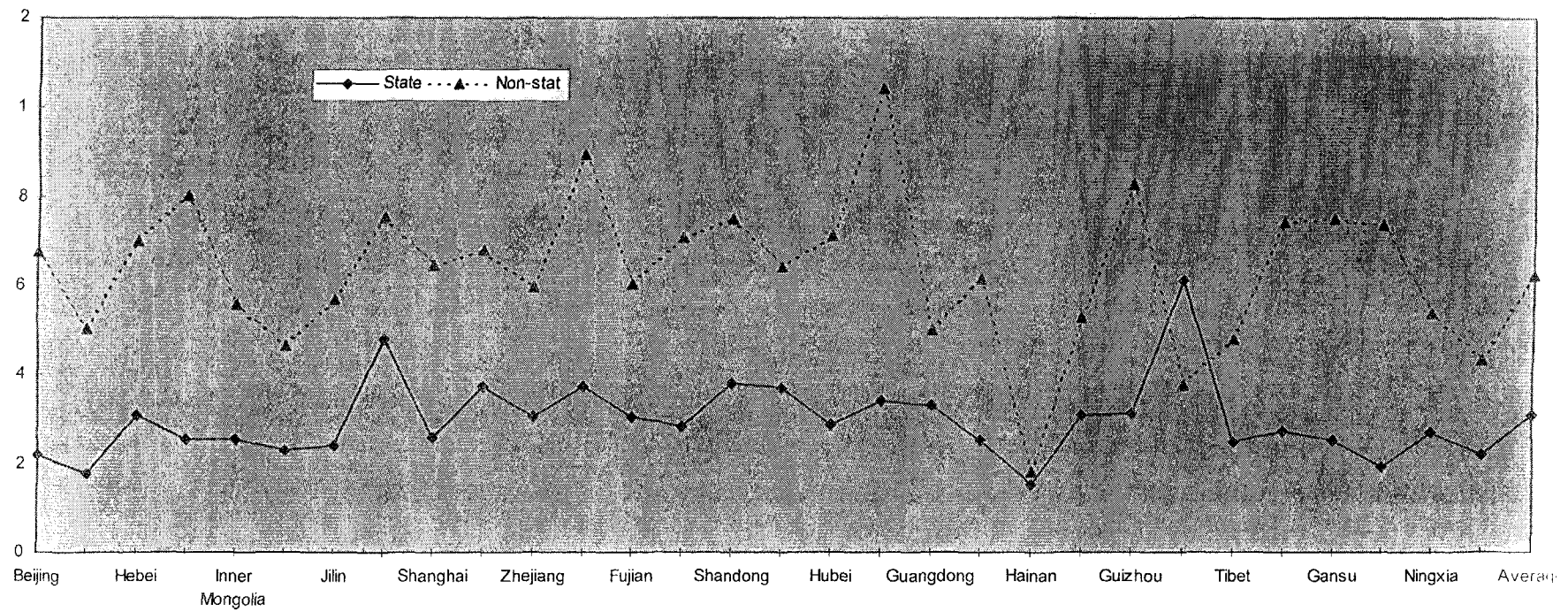


Chart A2.

Average productivity of capita



**Table A1. A Summary of Major Labor Redeployment Program in China**

Type of Program	Key Features of Program	Average length of program	Average cost per worker per year (Yuan)	Program coverage	Financing
<b>1. Passive Labor Program</b>					
Unemployment insurance Fund	Eligibility: cover living expenses, health insurance and training	12-24 months	3,000-6,000	national level	2% of total company wage 1% of worker's wage local government subsidies interest payment on UI fund
Early retirement	50-75% of base wage 5 Yrs from retirement age		4,080	national level	government
Basic Living allowance Subsidy	250 Yuan/month plus 50 yuan medical expenses	3 month - 2yrs	3,000	national level	company and government
One time lump-sum payment (severance payment)	na	one time	na		
<b>2. Active Labor program</b>					
Training without reemployment	Dependent on length		2,000	na	company
Training & Reemployment program	Including cost-living support Job training and job introduction	3-12 months	6,000	Beijing Textile Trust Center	30% from enterprise 40% from Municipal Labor Bureau 30% from Municipal Finance Bureau
Subsidy to employment of Redundant workers	Labor service company receive a lump-sum payment for hiring Redundant workers up to 2 yrs.	one time	4,000-6,000	Shanghai Reemployment Service Center	government, society and share holding companies
Cash payment to self-Employment	help to set up individual business	one time	10,000	Some cities	
Tax break to company (a lump sum payment)	if firm hires more than 60% of redundant workers, is eligible for a tax break for 3 years and 50% for next 2 years.	na	na	Shanghai and Beijing	Municipal Labor Bureau

Notes: 1) main categories of redundant workers: redundant leaving post and earlier retirement. Redundant or laid-off workers: defined as "people temporarily on leave from their work-places due to a deteriorating situation in their enterprise but still maintaining employment situation with enterprises and receiving layoff allowances." Exactly how many there are of these laid off workers is still unknown because of different results obtained from different sources.

2) Various program cost above is based on one year cost.



## Estimated Model

In order to estimate marginal productivity of factors for state and non-state, we employ the following simple across-section equation of traditional Cobb-Douglas translog production function. Capital and labor are used as inputs in our model.

$$Q_i = f(K_i, L_i); Q_i = A_i K_i^a L_i^b \Rightarrow \ln Q_i = \ln A_i + a \ln K_i + b \ln L_i \quad (1)$$

Where  $Q_i$  represents value added of industrial output in nominal terms in province  $i$  ( $i=1, \dots, n$ ) and  $K_i$  represents the amount of fixed capital stock, and  $L_i$  represents a physical count of the number of workers.

(More details on concept of capital)

### 1. Estimating optimal amount of labor and capital redundancy in state sector

The Equation (2) and (3) are derived from the Equation (1) by equalizing marginal productivity of labor and capital between state and non-state sector.

$$MPL_s = MPL_p = \frac{\partial Q_{is}}{\partial L_{is}} = \frac{\partial Q_{ip}}{\partial L_{ip}} = A_{is}(1-a_s) k_i^{a(s)} = A_{ip}(1-a_p) k_i^{a(p)} \quad (2)$$

$$MPK_s = MPK_p = \frac{\partial Q_{is}}{\partial K_{is}} = \frac{\partial Q_{ip}}{\partial K_{ip}} = A_{is}a_s k_i^{a(s)-1} = A_{ip}a_p k_i^{a(p)-1} \quad (3)$$

$$\text{Where, } k_i = \left( \frac{K_i}{L_i} \right)$$

Where  $Q_i$  represents value added of industrial output in nominal terms in province  $i$  ( $i=1, \dots, n$ ) and  $K_i$  represents the amount of fixed capital stock, and  $L_i$  represents a physical count of the number of workers in province  $i$  ( $i=1, \dots, n$ ).  $s$  stands for state sector,  $p$  stands for non-state sector.

## 2. *Estimates output change in both state and non-state sector after factors (labor and capital) transfer*

### 1. State sector

Original output level before factors transfer is:

$$Q_{s, (0\%)} = A_0 K_0^a L_0^b$$

New output level after factors transfer is:

$$Q_{s, (x\%)} = A_1 K_1^a L_1^b$$

Where,  $K_1 = K_0 - K_{x\%}$ ,  $L_1 = L_0 - L_{x\%}$ . If only transfer labor, L, and keeping capital unmoved, then  $K_{x\%} = 0$ , and  $K_1 = K_0$ . Similarly, if only transfer capital stock, K, and keeping labor unmoved, then  $L_{x\%} = 0$ , and  $L_1 = L_0$ .  $X\%$  represents the amount of factor transfer from state sector to non-state sector.  $0\%$  represents no factor transfer.

Then, the changes of output in state sector after factors transfer is:

$$\Delta Q_s / Q_s = (Q_{s, (x\%)} - Q_{s, (0\%)}) / Q_s = (A_1 K_1^a L_1^b - A_0 K_0^a L_0^b) / A_0 K_0^a L_0^b \quad (4)$$

### 2. Non-state sector

Original output level before factors transfer is:

$$Q_{p, (0\%)} = A_0 K_0^a L_0^b$$

New output level after factors transfer is set to be:

$$Q_{p, (x\%)} = A_1 K_1^a L_1^b$$

Where,  $K_1 = K_0 + K_{x\%}$ ,  $L_1 = L_0 + L_{x\%}$ . If only transfer labor, L, and keeping capital unmoved, then  $K_{x\%} = 0$ , and  $K_1 = K_0$ . Similarly, if only transfer capital stock, K, and keeping labor unmoved, then  $L_{x\%} = 0$ , and  $L_1 = L_0$ .

The gain of output in state sector after factors transfer is:

$$\Delta Q_p/Q_p = (Q_p^{(x\%)} - Q_p^{(0\%)})/Q_p = (A_1 K_1^a L_1^b - A_0 K_0^a L_0^b) / A_0 K_0^a L_0^b \quad (5)$$

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